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PATENT **MS158283.02/MSFTP293USA**

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Date: 3-10-05

Himanshu S. Amin

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:	
Applicant(s): Eric J. Horvitz, *et al.*	Examiner: Chanda L. Harris
Serial No: 10/686,198	Art Unit: 3714
Filing Date: October 15, 2003	

Title: METHODS AND APPARATUS FOR PREDICTING AND SELECTIVELY COLLECTING PREFERENCES BASED ON PERSONALITY DIAGNOSIS

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Applicants' representative submits this brief in connection with an appeal of the above-identified patent application. A credit card payment form is filed concurrently herewith in connection with all fees due regarding this appeal brief. In the event any additional fees may be due and/or are not covered by the credit card, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1063 [MSFTP293USA].

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I. Real Party in Interest (37 C.F.R. §41.37(c)(1)(i))

The real party in interest in the present appeal is Microsoft Corporation, the assignee of the present application.

II. Related Appeals and Interferences (37 C.F.R. §41.37(c)(1)(ii))

Appellants, appellants' legal representative, and/or the assignee of the present application are not aware of any appeals or interferences which may be related to, will directly affect, or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims (37 C.F.R. §41.37(c)(1)(iii))

Claims 25-44 and 46-59 are currently pending in the subject application and are presently under consideration. Claims 25-44 and 46-59 stand rejected by the Examiner, and claims 1-24 and 45 have been cancelled. The rejection of claims 25-44 and 46-59 is being appealed.

IV. Status of Amendments (37 C.F.R. §41.37(c)(1)(iv))

Claim 45 has been cancelled in accordance with the Examiner's objection, and is not appealed herein.

V. Summary of Claimed Subject Matter (37 C.F.R. §41.37(c)(1)(v))

A. Independent Claim 25

Independent claim 25 recites a collaborative filtering system that comprises a personality type generator that analyzes known attributes relating to a user and calculates probabilities that the user has a personality type substantially similar to personality types of a plurality of disparate users, wherein the personality types of the plurality of disparate users are based at least in part upon attributes related to such users, and further comprises an attribute value predictor that predicts unknown attributes relating to the user based at least in part upon the calculated probabilities. (*See e.g.*, page 15, lines 7-20).

B. Independent Claim 48

Independent claim 48 recites a method for providing recommendations to a user, the method comprises collecting attributes from a user, the attributes relate to items accessible *via* a browser, calculating a probability that the user has a personality type substantially similar to a disparate user based at least in part upon the collected attributes and attributes related to the disparate user, generating attributes for the user based at least in part upon the calculated probability, and recommending an item to a user based at least in part upon the generated attributes. (*See e.g.*, page 21, lines 11-23, page 15, lines 7-20).

C. Independent Claim 58

Independent claim 58 recites a system that facilitates Internet searching that comprises means for collecting attributes relating to an entity (*See e.g.*, page 20, lines 20-23), means for comparing the collected attributes with attributes related to a plurality of disparate entities (*See e.g.*, page 23; lines 6-17 and lines 35-30), means for calculating probabilities that the entity will act in a manner substantially similar to the disparate entities based at least in part upon the comparison (*See e.g.*, page 27, lines 1-7), and means for generating new attributes relating to the entity based at least in part upon the calculated probabilities (*See e.g.*, page 27, lines 9-25).

The "means for" limitations described above are identified as limitations subject to the provisions of 35 U.S.C. §112 ¶6. The structures corresponding to these limitations are identified with reference to the specification and drawings in the above noted parentheticals.

VI. Grounds of Rejection to be Reviewed (37 C.F.R. §41.37(c)(1)(vi))

A. Claims 25-47 stand rejected under 35 U.S.C. §101 for allegedly failing to produce a useful, concrete, and tangible result.

B. Claims 25-26, 28, 36-40, 44-55, and 57-59 stand rejected under 35 U.S.C. §102(b) as being anticipated by Robinson (US 5,884,282).

C. Claims 35 and 56 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Robinson in view of Knight, *et al.* (US 6,571,234).

VII. Argument (37 C.F.R. §41.37(c)(1)(vii))

A. Rejection of Claims 25-47 Under 35 U.S.C. §101

Claims 25-47 stand rejected under 35 U.S.C. §101. The Examiner contends that these claims do not produce a useful, concrete, and tangible result, and that such claims must explicitly be directed towards a computer-readable medium that is encoded with a computer program. Applicants' representative respectfully avers to the contrary in view of the description in the specification of elements within the subject claims together with relevant case law.

> Because the claimed process [method] applies the Boolean principle to produce a useful, concrete, tangible result ... on its face the claimed process comfortably falls within the scope of §101. *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352, 1358. (Fed.Cir. 1999); *See State Street Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373, 47 USPQ2d 1596, 1601 (Fed.Cir.1998) (finding a system implementing a financial management structure satisfied §101 because it constituted a practical application of a mathematical algorithm by producing a useful, concrete and tangible result).

As discussed in the Reply to Final Office Action, the Reply to Advisory Action, and is reiterated herein, the invention as claimed *clearly* produces a useful, concrete, and tangible result. Independent claim 25 recites system components (a personality type generator and an attribute value predictor) that ***calculate probabilities*** relating to ***personality type(s)*** and ***predict unknown attributes relating to a user based at least in part upon the calculated probabilities***. Thus, it is readily apparent that the claimed collaborative filtering system comprises a personality type generator and an attribute value predictor, which are functionally related and in conjunction enable predictions of unknown attributes to be generated. Thus, claim 25 recites independent acts (analyzing and calculating) that are performed on non-abstract ideas (known attributes and probabilities) to produce useful, concrete, and tangible results (predictions of unknown attributes). The subject specification provides ample examples of practical applications along with satisfactory explanations

illustrating the usefulness of the claimed collaborative filtering system that enables the aforementioned prediction of unknown attributes - such as: "The present invention relates to predicting and selectively collecting attribute values, such as a person's preferences, as might be indicated by item rankings for example" (*See* p. 1 lines 9-11), "... the probability that they (a user) will have a given value (*e.g.*, rating) for a valueless (*e.g.*, unrated) attribute (*e.g.*, item) may then be determined based on the user's personality type", (*See* p. 15, lines 17-20), and "The present invention concerns novel methods, apparatus, and data structures for predicting the values of attributes (*e.g.*, predicting item ratings to be used in recommending items) without at least some of the drawbacks of memory-based and model-based collaborative filtering systems." (*See* p. 17, lines 18-23). In view of at least the above, it is apparent that the claimed invention produces a useful, concrete, tangible result (*e.g.*, prediction(s) of unknown attributes) pursuant to *AT&T Corp. v. Excel Communications, Inc.* Accordingly, this rejection should be withdrawn.

The Examiner further contends that the subject claims are directed towards non-statutory subject matter, indicating that the claims must explicitly recite that they are existent within a computer-readable medium that is encoded within a computer program. Applicants' representative respectfully submits that the Examiner's stance is contrary to relevant case law. In particular, the standard for determining whether claims are directed towards statutory subject matter is whether such claims produce a useful, concrete, and tangible result. *See AT&T Corp. v. Excel Communications, Inc.* 172 F.3d 1352, 1358. (Fed.Cir. 1999). As described above, the subject claims clearly meet this standard. Further, the specification clearly indicates that the claimed ***personality type generator*** and ***attribute value predictor*** are existent within a computer (*See* Fig. 1 and accompanying text, indicating that a front end is a client and that a back end is a server), (*See* Fig. 5 and accompanying text, illustrating basic computer components that are utilized to effectuate the claimed collaborative filtering system), (*See* pg. 22, lines 4-13, briefly describing an interaction of the claimed personality type generator and attribute value predictor upon a server system), (*See* pg. 23, line 6 – pg. 26, line 27 for a detailed explanation of utilization of the claimed personality type generator and attribute value predictor), (*See* pg. 1, lines 17-25, wherein problems with conventional computer systems are discussed). It is further submitted that such claims are to be viewed in light of context of the specification. (*See Markman v. Westview Instruments*, 52 F.3d 967,

980, 34 USPQ2d 1321, 1330 (*en banc*), *aff'd*, U.S., 116 S. Ct. 1384 (1996), holding that office personnel must rely on applicant's disclosure to properly determine the meaning of the claims), (*See Toro Co. v. White Consolidated Industries Inc.*, 199 F.3d 1295, 1301, 53 USPQ2d 1671, 1674 (Fed. Cir. 1994), stating that meaning of words utilized in a claim are to be construed "in the context of the specification and drawings.").

The specification clearly indicates that the personality type generator and attribute value predictor are existent within a computer (*See* Figs. 1 and 5 and accompanying text), and such elements are functionally related with one another, and such computer elements interact to produce a useful, concrete, and tangible result. Thus, it is submitted that the subject claims are directed towards statutory subject matter. Accordingly, reversal of this rejection is respectfully requested.

B. Rejection of Claims 25-26, 28, 30-34, 36-40, 44-55, and 57-59 Under 35 U.S.C. §102(b)

Claims 25-26, 28, 30-34, 36-40, 44-55, and 57-59 stand rejected under 35 U.S.C. §102(b) as being anticipated by Robinson (US 5,884,282). Withdrawal of this rejection is respectfully requested for at least the following reason. Robinson does not disclose each and every element of applicants' invention as claimed.

> For a prior art reference to anticipate, 35 U.S.C. §102 requires that "each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999) (*quoting Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)).

In particular, Robinson does not disclose, teach, or suggest ***calculating probabilities that a user has a personality type substantially similar to personality types of a plurality of disparate users*** as recited in independent claims 25 and 48. Specifically, Robinson is silent with regard to a ***personality type*** as recited in these claims and defined in the specification, wherein a determined ***personality type*** is utilized for ***predicting unknown attributes relating to a user***.

Applicants' claimed invention relates to a system and methodology that improves upon both memory-based and model-based collaborative filtering techniques utilized by conventional systems/methodologies. In particular, memory-based collaborative filtering techniques can be computationally expensive and provide no insight as to how a recommendation or prediction was generated. Model-based collaborative filtering techniques may require frequent updating of a model (*e.g.*, each time new data is entered, the model may require compiling). The invention as claimed alleviates such deficiencies by utilizing a ***personality type*** of users through ***calculating probabilities that a user has a personality type substantially similar to personality types of a plurality of disparate users***. A user's reported attribute values can be interpreted as a manifestation of their underlying ***personality type***. More particularly, a ***personality type*** of a user is defined in the specification as a vector of the user's "true" values for attributes in a database, where "true" values are obtained by assuming that users report values with a distributed error. (*See* p. 15, lines 10-17). For example, a same user may report different ratings on different occasions. (*See* p. 24, line 24 - p. 25, line 14).

The Examiner, in the Final Office Action, contends that Robinson teaches the claimed ***personality type generator that... calculates probabilities that the user has a personality type substantially similar to personality types of a plurality of disparate users***. It is respectfully submitted, however, that Robinson is silent with regards to ***a personality type*** as claimed. In contrast to the claimed invention, however, Robinson teaches comparing ratings of items of an active user with previously obtained ratings of items of a plurality of disparate users to generate a prediction and/or provide the active user with a recommendation. Specifically, Robinson discloses determining a similarity level between a first user and one or more disparate users, and providing a recommendation for an item as a function of the determined similarity level. (*See* col. 2, lines 31-34). Robinson further contemplates effects of a random user in connection with determining a level of similarity between a user and one or more different users. For example, two users providing a favorable rating with respect to one movie (given that the users have not both provided rankings to other movies) represents evidence that such users have similar taste in connection with all movies. If, however, a vast majority of all users also provided a favorable ranking to the movie, there is less evidence that the pair

of users has similar taste with respect to all movies. Thus, Robinson teaches a system that compares ratings of items of an active user with previously obtained ratings of items of a plurality of disparate users in light of a probability that a random user would select substantially similar ratings. Robinson, however, does not disclose utilizing ***personality types*** as recited in the claim and explicitly defined in the specification to generate predictive values for unknown attributes. It is black letter law that applicants can utilize explicit definitions of terms to define their invention (*e.g.*, applicants can be their own lexicographers).

> It is black letter law that a patentee can choose to be his or her own lexicographer by clearly setting forth an explicit definition for a claim term that could differ in scope from that which would be afforded by its ordinary meaning. ***The specification acts as a dictionary when it expressly defines terms used in the claims*** or when it defines terms by implication. Where the patentee has clearly defined a claim term, that definition usually is dispositive; it is the single best guide to the meaning of a disputed term. *Guttman, Inc. v. Kopykake Enters.*, 302 F.3d 1352 (Fed. Cir. 2002) (citations omitted) (emphasis added).

As described above, a ***personality type*** is explicitly defined as a vector of the user's "true" values for attributes in a database, where "true" values are obtained by assuming that users report values with a distributed error. (*See* p. 15, lines 10-17). Robinson does not consider that a user can alter attributes depending on context (*e.g.*, time of day, current mood of the user, ...), and nowhere discloses contemplating that users report values with distributed error. Therefore, Robinson does not disclose that any "true" values with respect to a user are obtained, and is further silent with respect to a ***personality type***, much less a ***personality type*** utilized in connection with ***predicting unknown attributes***. On this basis alone, the subject rejection with respect to claims 1 and 48 (and all claims dependent therefrom) should be withdrawn.

Regarding claim 58, such claim is a means plus function claim under 35 U.S.C. §112 sixth paragraph, which states that a claim limitation expressed in means-plus function language "shall be construed to cover the corresponding structure... described in

the specification and equivalents thereof." Claim 58 recites ***means for calculating probabilities that an entity will act in a manner substantially similar to... disparate entities***, wherein the structure described in the specification is a personality type generator that calculates a probability that a user has a ***personality type*** that is substantially similar to personality types of disparate users. As described above, Robinson does not teach or suggest any sort of utilization of a ***personality type*** as defined in the specification, and further does not disclose any equivalents thereof. Accordingly, applicants' representative contends that the rejection with respect to claim 58 is improper, and that the subject rejection should be withdrawn with respect to this claim (and claim 59, which depends therefrom).

With respect to dependent claims 30 and 50 (and all claims which depend therefrom), Robinson nowhere discloses ***selectively requesting attributes from the user based upon a use of expected value of information***. As described in the specification, ***expected value of information*** is a decision-theoretic calculation that computes the value of obtaining particular attributes. For example, ***expected value of information*** can be employed to favorably order queries for attribute values, wherein the ***expected value of information*** is balanced with costs or difficulty of answering a question about preferences of a user. (*See* p. 15, line 26-page 16, line 1). Furthermore, ***expected value of information*** can be used to generate a number of most valuable questions to ask a user to limit a number of questions presented to such user (and/or a number of accesses to a database). (*See* p. 16, lines 1-6). Moreover, ***expected value of information*** can be employed to determine entries of a database to prune or ignore (*e.g.*, determine entries within a database that, if removed, would have minimal effect on accuracy recommendations). (*See* p. 16, lines 6-10).

In contrast to the invention as claimed, Robinson teaches a system that searches a data store for user(s) that have given a ranking to an item that has also been ranked by an active user. (*See* col. 6, lines 37-40). Upon locating these user(s), a similarity value with respect to the user(s) can be calculated, and a collection of user(s) most similar to the active user is utilized to generate predictions for such active user. It can be easily discerned from the above that Robinson does not contemplate any sort of calculation relating to an expectancy (*e.g.*, ***an expected value of information***), but rather at most

searches for users that have previously rated items also rated by an active user. Furthermore, the portion of Robinson cited by the Examiner with respect to claim 50 discloses providing a recommendation to a user, but clearly does not teach any form of request directed towards a user, much less ***requesting attributes from the user based upon a use of expected value of information.*** (*See* col. 2, lines 54-57).

In view of at least the above, it is readily apparent that Robinson does not disclose each and every element of independent claims 25, 48, and 58 (and claims 26, 28, 30-34, 36-40, 44, 46-47, 49-55, 57, and 59 which respectively depend therefrom). Accordingly, this rejection should be withdrawn.

C. Rejection of Claims 35 and 56 Under 35 U.S.C. §103(a)

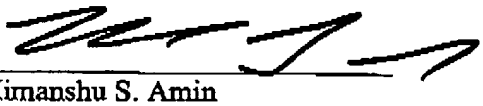
Claims 35 and 56 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Robinson in view of Knight, *et al.* (US 6,571,234). Withdrawal of this rejection is respectfully requested for at least the following reasons. Knight, *et al.* discloses a system that automatically classifies messages upon a message board and, like Robinson, does not disclose employing ***a personality type*** in connection with ***predicting unknown attributes*** as recited in independent claims 25, 48, and 58. Therefore, Knight, *et al.* fails to make up for the aforementioned deficiencies of Robinson – accordingly, this rejection should be withdrawn.

D. **Conclusion**

For at least the above reasons, the claims currently under consideration are believed to be patentable over the cited references. Accordingly, it is respectfully requested that the rejections of claims 25-44 and 46-59 be reversed.

If any additional fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP293USA].

Respectfully submitted,
AMIN & TUROCY, LLP



Himanshu S. Amin
Reg. No. 40,894

AMIN & TUROCY, LLP
24th Floor, National City Center
1900 East 9th Street
Telephone: (216) 696-8730
Facsimile: (216) 696-8731

VIII. Claims Appendix (37 C.F.R. §41.37(c)(1)(viii))

1 – 24. Cancelled.

25. A collaborative filtering system, comprising:

a personality type generator that analyzes known attributes relating to a user and calculates probabilities that the user has a personality type substantially similar to personality types of a plurality of disparate users, wherein the personality types of the plurality of disparate users are based at least in part upon attributes related to such users; and

an attribute value predictor that predicts unknown attributes relating to the user based at least in part upon the calculated probabilities.

26. The system of claim 25, further comprising a recommendation facility that provides recommendations to the user based at least in part upon the predicted attributes.

27. The system of claim 26, the recommendation facility weighs a cost of disturbing the user against a benefit of providing the user with the recommendation prior to providing the user with the recommendations.

28. The system of claim 25, further comprising a query facility that requests an attribute from the user.

29. The system of claim 28, the query facility weighs a cost of disturbing the user against a benefit of obtaining the attribute prior to requesting the attribute from the user.

30. The system of claim 28, the query facility employs expected value of information in connection with requesting the attribute from the user.

31. The system of claim 30, attributes are selectively requested from the user based upon one or more of a discriminatory value of information relating to the user and a consideration of a likelihood that the user is familiar with items being asked about given current uncertainty about the user.

32. The system of claim 31, attributes are selectively requested from the user based upon a discriminatory value of the information, including an analysis of a consideration of a likelihood of different answers to a query given current uncertainty about the user.

33. The system of claim 25, the personality types of the plurality of disparate users generated using at least known attributes relating to each of the plurality of disparate users.

34. The system of claim 33, the known attributes relating to the plurality of disparate users is accessible from a data table.

35. The system of claim 34, further comprising a pruning facility, the pruning facility employed to reduce a number of known attributes to consider when generating the personality types of the plurality of users.

36. The system of claim 25, the known attributes relating to the user associated with a calculated variability.

37. The system of claim 36, the variability is Gaussian.

38. The system of claim 25, the personality types are at least partially defined by vectors, the vectors include attributes relating to the plurality of disparate users.

39. The system of claim 38, the probabilities that the user has a personality type substantially similar to personality types of the plurality of disparate users are calculated at least partially by a frequency that the plurality of disparate users rate items according to the vectors.

40. The system of claim 39, a number of occurrences that the disparate users rate items according to the vectors are explicitly counted.

41. The system of claim 25, the personality type generator determines at least one probability that the user has a personality type substantially similar to any other personality type by employing the expression

$$\Pr\left(R_a^{true} = R_i \mid R_{a1} = x_1,..R_{am} = x_m\right) \propto \Pr\left(R_{a1} = x_1 \mid R_{a1}^{true} = R_{i1}\right).\Pr\left(R_{am} = x_m \mid R_{am}^{true} = R_{im}\right) \bullet \Pr(R_a^{true} = R_i)$$

where R_a^{true} is a vector of the user's internal preferences for one or more titles, R_i is a vector of a disparate user's ratings, R_a is a vector of the user's actual ratings, and x is a particular rating within R_i.

42. The system of claim 41, wherein $\Pr\left(R_a^{true} = R_i\right)$ is assumed to be $\frac{1}{n}$, where n is a number of the disparate users.

43. The system of claim 41, the attribute value predictor at least partially predicts unknown attributes relating to the user by employing the expression

$$\Pr\left(R_{aj} = x_j \mid R_{a1} = x_1,...,R_{am} = x_m\right) = \sum_{i=1}^{n} \Pr\left(R_{aj} = x_j \mid R_a^{true} = R_i\right) \bullet \Pr\left(R_a^{true} = R_i \mid R_{a1} = x_1,...R_{am} = x_m\right)$$

where j is an attribute that has not been rated by the user.

44. The system claim 25, the personality generator employs a Bayesian Network to calculate the probabilities that the user has a personality type substantially similar to personality types of the plurality of disparate users.

45. Cancelled.

46. The system of claim 25 residing on a server.

47. The system of claim 25 accessed over a network.

48. A method for providing recommendations to a user, comprising:

collecting attributes from a user, the attributes relate to items accessible *via* a browser;

calculating a probability that the user has a personality type substantially similar to a disparate user based at least in part upon the collected attributes and attributes related to the disparate user;

generating attributes for the user based at least in part upon the calculated probability; and

recommending an item to a user based at least in part upon the generated attributes.

49. The method of claim 48, further comprising selectively requesting attributes from the user based upon a value of obtaining the information.

50. The method of claim 49, further comprising selectively requesting attributes from the user based upon a use of expected value of information.

51. The method of claim 50, further comprising selectively requesting attributes from the user based upon one or more of a discriminatory value of information relating to the user and a consideration of a likelihood that the user is familiar with items being asked about given current uncertainty about the user.

52. The method of claim 51, further comprising selectively requesting attributes from the user based upon a discriminatory value of the information, including an analysis of a consideration of a likelihood of different answers to a query given current uncertainty about the user.

53. The method of claim 48, one or more of the attributes being ratings relating to items.

54. The method of claim 53, the items being one or more of video content, textual content, audio content, image content, multi-media content, a service, a consumer good, a business good, clothing, and a financial instrument.

55. The method of claim 48, further comprising calculating a plurality of probabilities that the user has a personality type substantially similar to a plurality of disparate users based at least in part upon the collected attributes and attributes related to the disparate users.

56. The method of claim 48, further comprising selectively reducing a number of attributes to consider when calculating the probability that the user has a personality type substantially similar to the disparate user.

57. The method of claim 48, further comprising employing a Bayesian network in connection with recommending the item to the user.

58. A system that facilitates Internet searching, comprising:

means for collecting attributes relating to an entity;

means for comparing the collected attributes with attributes related to a plurality of disparate entities;

means for calculating probabilities that the entity will act in a manner substantially similar to the disparate entities based at least in part upon the comparison;

means for generating new attributes relating to the entity based at least in part upon the calculated probabilities.

59. The system of claim 58, further comprising means for providing the entity with a recommendation based at least in part upon the new attributes.

IX. Evidence Appendix (37 C.F.R. §41.37(c)(1)(ix))

None.

X. Related Proceedings Appendix (37 C.F.R. §41.37(c)(1)(x))

None.